Conservation of refugia and their evolutionary lineages

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The evolutionary history of the Australian biota has been significantly influenced by Pleistocene climatic oscillations, which ranged from warm, wet interglacial conditions to cool, dry environments during glacial maxima, and that became more extreme from the mid-Pleistocene with increasing aridity. Genetic signatures reveal multiple levels of divergence and complex geographical structuring in both arid and mesic environments. In arid environments the effects of increased aridity may have been less significant than in mesic environments, where increased aridity would be expected to lead to major contraction of the biota. These genetic signatures of high diversity and endemism indicate persistence of the biota through climatic oscillations over multiple glacial cycles as a major response to changing climatic conditions. There is growing interest in understanding the role of historical refugia in facilitating persistence through the Pleistocene, and their potential role in conservation of the current biota under future climate variability. While many species show patterns consistent with multiple localised refugia throughout species' distributions, areas of more major refugia are likely to have facilitated persistence and recolonisation. Proposed areas that would act as refugia during arid conditions include buffered coastal areas, ranges and granite outcrops. Several recent studies have revealed genetic patterns identifying these areas as refugia in south-west and north-west Australia. Presence of refugia and areas of localised persistence highlight the importance of dynamic evolutionary processes and a mosaic of habitats in heterogeneous landscapes for species persistence though changing environmental conditions.

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